

1. A drop hammer for driving a pile comprising:  
a housing member defining a housing chamber; and  
a ram member supported within the housing chamber for movement  
relative to the housing member between an upper position  
5 and a lower position; whereby  
when the ram member moves into the lower position, the impact of  
the ram member drives the pile; and  
when the ram member falls below a preload position between the  
lower and upper positions, fluid within a preload chamber  
10 portion of the housing chamber compresses as the ram  
member moves into the lower position.
2. A drop hammer as recited in claim 1, in which the housing  
member comprises a vent port for allowing fluid flow into and out of the  
15 housing chamber under predetermined conditions.
3. A drop hammer as recited in claim 2, in which the vent port  
allows ambient air to flow into the housing chamber.
- 20 4. A drop hammer as recited in claim 2, in which fluid is  
prevented from flowing through the vent port when the ram member is  
below the preload position.
- 25 5. A drop hammer as recited in claim 4, further comprising seal  
system for sealing the preload chamber portion of the housing chamber  
when the ram member is below the preload position.
- 30 6. A drop hammer as recited in claim 5, in which:  
the ram member defines a ram side wall;  
the housing member defines a housing interior wall;

the seal system comprises a ram seal for inhibiting fluid flow  
between the ram side wall and the housing interior wall.

7. A drop hammer as recited in claim 1, further comprising a  
5 helmet member supported by the housing member for movement relative  
to the housing member between a rest position and an impact position,  
where the impact of the ram member is transmitted to the pile through the  
helmet member.

10 8. A drop hammer as recited in claim 5, further comprising:  
a helmet member supported by the housing member for movement  
relative to the housing member between a rest position and  
an impact position; wherein  
the impact of the ram member is transmitted to the pile through the  
15 helmet member;  
the helmet member extends through a helmet opening formed in  
the housing member; and  
the seal system comprises a helmet seal for inhibiting fluid flow  
between the helmet member and the housing member  
20 through the helmet opening.

9. A drop hammer as recited in claim 8, in which:  
the ram member defines a ram side wall;  
the housing member defines a housing interior wall;  
25 the seal system comprises a ram seal for inhibiting fluid flow  
between the ram side wall and the housing interior wall.

10. A drop hammer as recited in claim 1, further comprising a  
lifting system for moving the ram member from the lower position to the  
30 upper position.

11. A drop hammer as recited in claim 1, further comprising a clamp assembly for securing the drop hammer to the pile.

5 12. A drop hammer as recited in claim 7, further comprising a clamp assembly for securing the helmet member to the pile.

10 13. A method of driving a pile comprising:  
providing a housing member defining a housing chamber; and  
supporting a ram member within the housing chamber for  
movement relative to the housing member between an upper  
position and a lower position;  
raising the ram member into the upper position;  
allowing the ram member to fall from the upper position to the lower  
15 position such that the impact of the ram member drives the  
pile;  
while the ram member is above a preload position, allowing fluid to  
flow out of a preload chamber portion of the housing  
chamber defined by the housing member; and  
20 while the ram member is below the preload position, substantially  
preventing fluid from flowing out of the preload chamber  
portion of the housing chamber, where fluid within the  
preload chamber portion of the housing chamber  
compresses as the ram member moves from the preload  
25 position to the lower position.

14. A method as recited in claim 13, further comprising the step  
of allowing ambient air to flow into the housing chamber as the ram  
member is raised above the preload position.

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15. A method as recited in claim 13, further comprising the step of sealing the preload chamber portion of the housing chamber when the ram member is below the preload position.

5           16. A method as recited in claim 13, further comprising the steps of:

                  supporting a helmet member for movement relative to the housing member between a rest position and an impact position; and  
                  transmitting the impact of the ram member to the pile through the  
10               helmet member.

                  17. A method as recited in claim 16, further comprising the step of securing the helmet member to the pile.

15           18. A drop hammer for driving a pile comprising:  
                  a housing member defining a housing chamber and a vent port;  
                  a ram member supported within the housing chamber for movement relative to the housing member between an upper position and a lower position; and  
20               a helmet member supported by the housing member for movement relative to the housing member between a rest position and an impact position; whereby  
                  as the ram member falls from the upper position to a preload position between the lower and upper positions, fluid exits  
25               the housing chamber through the vent port;  
                  when the ram member falls below the preload position, fluid within a preload chamber portion of the housing chamber compresses as the ram member moves into the lower position; and

when the ram member moves into the lower position, the impact of the ram member on the helmet member drives the pile.

5        19.     A drop hammer as recited in claim 18, further comprising  
seal system for sealing the preload chamber portion of the housing  
chamber when the ram member is below the preload position.

10       20.     A drop hammer as recited in claim 18, further comprising a  
lifting system for moving the ram member from the lower position to the  
upper position.

21.     A drop hammer as recited in claim 18, further comprising a  
clamp assembly for securing the helmet member to the pile.